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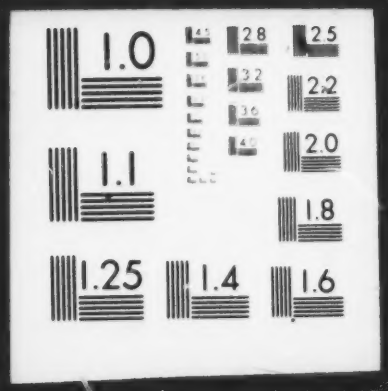

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RHODHISS LAKE, BURKE AND CALDWELL COUNTIES, NORTH CAROLINA

Pacific Northwest Environmental Research Laboratory

Prepared for:

National Environmental Research Center

June 1975

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NATIONAL EUTROPHICATION SURVEY

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16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

17. KEY WORDS AND DOCUMENT ANALYSIS

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eutrophication lakes nutrients phosphorus nitrogen loading		05B 05C

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REPORT

ON

RHODHISS LAKE

BURKE AND CALDWELL COUNTIES

NORTH CAROLINA

EPA REGION IV

WORKING PAPER NO. 388

WITH THE COOPERATION OF THE

NORTH CAROLINA DEPARTMENT OF NATURAL AND ECONOMIC RESOURCES

AND THE

NORTH CAROLINA NATIONAL GUARD

JUNE, 1975

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the North Carolina Department of Natural and Economic Resources for professional involvement and to the North Carolina National Guard for conducting the tributary sampling phase of the Survey.

Lewis R. Martin, Director of the Division of Environmental Management; Darwin L. Coburn, Chief of the Water Quality Section; and Julian R. Taylor, Supervisor of the Monitoring Program Unit; provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports and provided critiques most useful in the preparation of this Working Paper series.

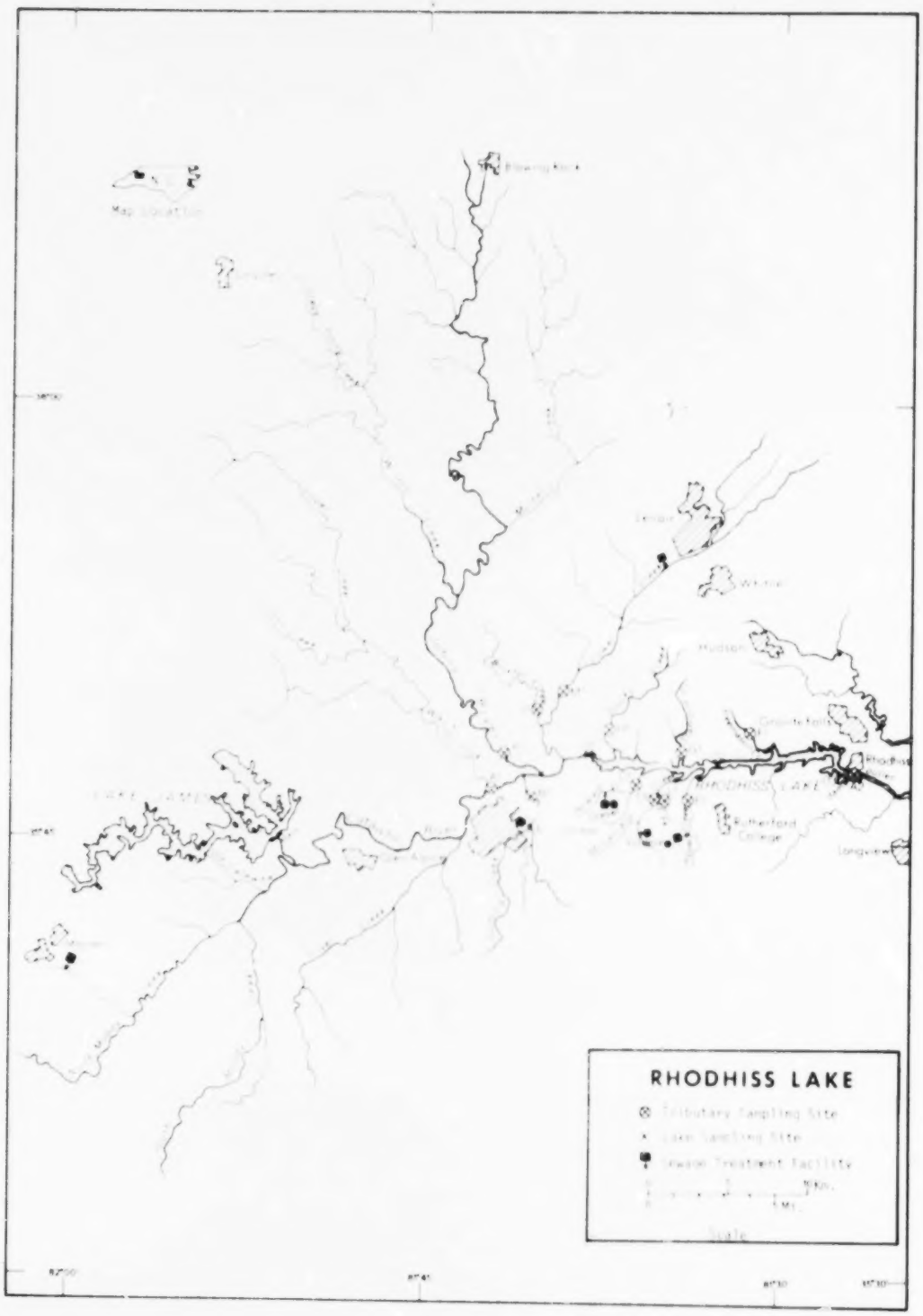
Major General William M. Buck, formerly Adjutant General of North Carolina, and Project Officer Colonel Arthur J. Bouchard, who directed the volunteer efforts of the North Carolina National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF NORTH CAROLINA

LAKE NAME	COUNTY
Badin	Montgomery, Stanly
Blewett Falls	Anson, Richmond
Chatuge	Clay, NC; Towns, GA
Fontana	Graham, Swain
Hickory	Alexander, Caldwell, Catawba
High Rock	Davidson, Rowan
Hiwassee	Cherokee
James	Burke, McDowell
John H. Kerr (Nut Bush Creek)	Granville, Vance, Warren, NC; Halifax, Mecklenburg, VA
Junaluska	Haywood
Lookout Shoals	Alexander, Catawba, Iredell
Mountain Island	Gaston, Mecklenburg
Norman	Catawba, Iredell, Lincoln, Mecklenburg
Rhodhiss	Burke, Caldwell
Santeetlah	Graham
Tillery	Montgomery, Stanly
Waccamaw	Columbus
Waterville	Haywood
Wylie	Gaston, Mecklenburg, NC; York, SC


RHODHISS LAKE
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Scale

RHODHISS LAKE

STORET NO. 3715

I. CONCLUSIONS

A. Trophic Condition:

Survey data show that Rhodhiss Lake is eutrophic. However, because the lake has a mean hydraulic retention time of only 21 days, it more closely resembles a slow-moving stream; and the term "over-enriched" may be a more appropriate description of the lake condition.

Rhodhiss Lake ranked ninth in overall trophic quality when the 16 North Carolina lakes sampled in 1973 were compared using a combination of six parameters*. Twelve of the lakes had less median total phosphorus, 13 had less median dissolved phosphorus, five had less median inorganic nitrogen, but only one of the lakes had less mean chlorophyll a. The relatively low concentrations of chlorophyll a and the high nutrient levels indicate primary productivity probably was light-limited. Ten of the lakes had greater mean Secchi disc transparency, and Survey limnologists noted that the water was turbid each sampling time.

Depression of dissolved oxygen with depth occurred at sampling stations 2 and 3 in July and September. Station 1 was not sampled at depths greater than 1.5 meters.

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* See Appendix A.

B. Rate-Limiting Nutrient:

The algal assay results show that Rhodhiss Lake was nitrogen limited at the time the assay sample was collected (03/30/73). The lake data indicate nitrogen limitation in March and September at station 2, and in September at station 3; i.e., the N/P ratios were 11/1 or less at those times. At the other stations and sampling times, the lake data indicate phosphorus limitation (the N/P ratios were greater than 14/1, and phosphorus limitation would be expected).

C. Nutrient Controllability:

1. Point sources--A minimum of 20.3% of the total annual phosphorus load to Rhodhiss Lake was contributed by point sources. Lenoir contributed 8.2% of the total, and Morganton contributed 7.6%.

The phosphorus loads of all of the known municipal point sources were estimated because none of the communities participated in the sampling program, and it is believed that most of these estimates are much too low. Note that the "non-point" export rates of Hunting Creek, Hoyle Creek, and McGalliard Creek were many times higher than the rates of the other Rhodhiss Lake tributaries (see page 16). These very high export rates and the very low export N/P ratios (3/1 or less) are indicative of a marked underestimation of point-source phosphorus loads.

If the mean of the phosphorus export rates of unimpacted Bristol, Freemason, Smoky, and Stafford creeks and the Johns River (24 $kg/km^2/yr$) is assumed to be a typical non-point export rate for streams in the Rhodhiss Lake drainage, and the point-source phosphorus contributions to Howard, Hoyle, Hunting, and McGalliard creeks are calculated accordingly, the point-source phosphorus input to the lake would be 59% of the total load rather than a little over 20%. Further study is needed to determine the actual point-source impact on Rhodhiss Lake.

During the sampling year, Rhodhiss Lake received a total phosphorus load at a rate seven times that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic rate (see page 17). However, the mean hydraulic retention time of the lake is only 21 days, and Vollenweider's model may not be applicable. Nonetheless, it is likely that a high degree of point-source phosphorus control would result in persistent phosphorus limitation throughout Rhodhiss Lake (see page 11) and would reduce the present rate of eutrophication. Such control probably would also benefit downstream Lake Hickory (Working Paper No. 380).

2. Non-point sources--It is calculated that 31.5% of the non-point source phosphorus load was contributed to Rhodhiss Lake by the Catawba River, whereas the Johns River with a drainage

area about one-third of that of the Catawba River, contributed only one-ninth as much phosphorus.

As mentioned above, the phosphorus export rates of Hunting Creek, Hoyle Creek, and McGilliard Creek were much too high and probably were due to point sources.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS†

A. Lake Morphometry††:

1. Surface area: 14.22 kilometers^2.
2. Mean depth: 6.3 meters.
3. Maximum depth: >14.6 meters.
4. Volume: 89.6 x 10^6 m^3.
5. Mean hydraulic retention time: 21 days.

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Catawba River	1,753.4	33.7
Hunting Creek	66.3	1.8
Hoyle Creek	15.8	0.2
McGalliard Creek	19.2	0.3
Howard Creek	13.7	0.2
Freemason Creek	18.9	0.3
Stafford Creek	16.1	0.3
Smoky Creek	21.2	0.4
Bristol Creek	23.8	0.5
Johns River	541.3	5.8
E. Fork, McGalliard Creek	2.3	<0.1
Lower Creek	224.3	2.7
Minor tributaries & immediate drainage -	92.5	2.2
Totals	2,808.8	48.4

2. Outlet -

Catawba River	2,823.1**	48.4**

† Table of metric conversions--Appendix B.
†† Park, 1974.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Includes area of lake; outflow adjusted to equal sum of inflows.

C. Precipitation*:

1. Year of sampling: 155.7 centimeters.

2. Mean annual: 129.0 centimeters.

* See Working Paper No. 175.

III. LAKE WATER QUALITY SUMMARY

Rhodhiss Lake was sampled three times during the open-water season of 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from three stations on the lake and from one or more depths at each station (see map, page v). During each visit, a single depth-integrated (4.6 m or near bottom to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the first visit, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 1.5 meters at station 1, 10.7 meters at station 2, and 14.6 meters at station 3.

The lake sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR RHODHISS LAKE
STORET CODE 3715

PARAMETER	1ST SAMPLING (3/30/73) 3 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (7/ 6/73) 3 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (9/24/73) 3 SITES RANGE	MEAN	MEDIAN
TEMP (C)	10.0 - 11.9	11.1	11.3	18.9 - 27.6	22.9	21.6	21.6 - 25.3	23.1	22.5
DISS OXY (MG/L)	9.0 - 10.0	9.6	9.5	1.4 - 11.4	7.0	7.4	3.0 - 9.4	5.5	5.2
CNDCTVY (MCROMO)	50. - 60.	53.	50.	50. - 65.	57.	55.	55. - 66.	60.	59.
PH (STAND UNITS)	7.6 - 7.7	7.6	7.6	6.5 - 9.3	7.4	6.8	6.4 - 6.6	7.1	6.7
TOT ALK (MG/L)	10. - 10.	10.	10.	16. - 24.	18.	18.	12. - 16.	15.	15.
TOT P (MG/L)	0.060 - 0.105	0.080	0.075	0.038 - 0.116	0.058	0.051	0.031 - 0.080	0.054	0.055
ORTHO P (MG/L)	0.016 - 0.040	0.025	0.022	0.007 - 0.028	0.012	0.010	0.012 - 0.033	0.022	0.023
NO2+NO3 (MG/L)	0.210 - 0.280	0.241	0.240	0.090 - 0.250	0.174	0.185	0.020 - 0.120	0.077	0.100
AMMONIA (MG/L)	0.040 - 0.110	0.082	0.090	0.060 - 0.440	0.145	0.105	0.050 - 0.230	0.115	0.120
KJEL N (MG/L)	0.200 - 0.400	0.264	0.200	0.200 - 0.900	0.470	0.400	0.300 - 0.700	0.436	0.400
INORG N (MG/L)	0.250 - 0.390	0.323	0.320	0.170 - 0.570	0.319	0.315	0.070 - 0.340	0.193	0.230
TOTAL N (MG/L)	0.410 - 0.680	0.505	0.440	0.430 - 1.000	0.644	0.575	0.400 - 0.820	0.514	0.510
CHLRPYL A (UG/L)	1.5 - 6.7	3.3	1.7	1.4 - 3.4	2.3	2.1	1.8 - 6.9	5.1	6.7
SECCHI (METERS)	0.6 - 0.9	0.7	0.8	0.6 - 0.9	0.8	0.9	0.7 - 1.9	1.3	1.4

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal units per ml
03/30/73	1. Melosira	500
	2. Flagellates	130
	3. Cryptomonas	60
	4. Asterionella	50
	5. Stephanodiscus	30
	Other genera	101
	Total	871
07/06/73	1. Oscillatoria	85
	2. Flagellates	68
	3. Centric diatoms	34
	4. Nitzschia	34
	5. Aphanizomenon	25
	Other genera	625
	Total	871
09/24/73	1. Lyngbya	1,120
	2. Oscillatoria	320
	3. Merismopedia	124
	4. Flagellates	110
	5. Synedra	104
	Other genera	772
	Total	2,550

2. Chlorophyll a -

Sampling Date	Station Number	Chlorophyll a (μg/l)
03/30/73	01	1.5
	02	1.7
	03	6.7
07/06/73	01	1.1
	02	3.4
	03	2.1
09/24/73	01	1.8
	02	6.9
	03	6.7

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.027	0.262	6.7
0.010 P	0.037	0.262	6.2
0.020 P	0.047	0.262	6.9
0.050 P	0.077	0.262	6.6
0.050 P + 1.0 N	0.077	1.262	26.3
1.0 N	0.027	1.262	10.2

2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicates that the potential primary productivity of Rhodhiss Lake was high at the time the assay sample was collected (03/30/73). Also, the lack of increase in yield with increasing concentrations of orthophosphorus along with a significant increase in yield with the addition of only

nitrogen indicate that the lake was nitrogen limited at that time.

The lake data indicate a combination of limiting nutrients. Station 2, which was close to point-source nutrient inputs, was nitrogen limited in March and September, but all three stations were phosphorus limited in July.

Following is a tabulation of the mean inorganic nitrogen to orthophosphorus ratios for each of the stations and sampling times with the indicated limiting nutrient in parenthesis.

Station	03/30/73	07/06/73	09/24/73
01	15/1 (P)	16/1 (P)	20/1 (P)
02	11/1 (N)	34/1 (P)	7/1 (N)
03	15/1 (P)	31/1 (P)	10/1 (N)

Nitrogen limitation, as indicated by the algal assay or by the in-lake nitrogen to phosphorus ratios, does not necessarily suggest that the trophic condition of the lake can be improved by controlling nitrogen inputs. In the majority of cases, phosphorus is still the element to be controlled. The apparent condition of nitrogen-limitation frequently results from excessive phosphorus input from point sources (e.g., station 2) and is often accompanied by a corresponding increase in primary production. The reversal of the enriched condition, therefore, depends upon phosphorus control, not nitrogen control.

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the North Carolina National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff months of January and February when two samples were collected. Sampling was begun in March, 1973, and was completed in February, 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the North Carolina District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. Nutrient loads shown are those measured minus point-source loads, if any.

Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the means of the nutrient loads, in $kg/km^2/year$, at stations F-1, G-1, H-1, and J-1 and multiplying the means by the ZZ area in km^2.

The communities of Drexel, Lenoir, Valdese, Marion, and Morganton did not participate in the sampling program, and nutrient loads were estimated at 1.134 kg P and 3.401 kg N/capita/year.

---

* See Working Paper No. 175.

A. Waste Sources:

1. Known municipal* -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)**	Receiving Water
Drexel	1,431	Imhoff tank	541.6	Howard Creek
Lenoir	14,705	trickling filter	5,565.8	Lower Creek
Valdese #1	1,060	prim. clarifier	401.2	Hoyle Creek
Valdese #2	2,122	ext. aer.	803.2	McGalliard Creek
Morganton	13,625	trickling filter	5,157.1	Hunting Creek
Marion	3,355	act. sludge	1,262.3	N. Muddy Creek

2. Known industrial - None

* Anonymous, 1971.
** Flow estimated at 0.3785 m^3/capita/day.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Catawba River	63,765	31.5
Hunting Creek	63,480	31.4
Hoyle Creek	3,830	1.9
McGalliard Creek	11,495	5.7
Howard Creek	870	0.4
Freemason Creek	615	0.3
Stafford Creek	485	0.2
Smoky Creek	315	0.2
Bristol Creek	680	0.4
Johns River	7,155	3.5
E. Fork, McGalliard Creek	150	<0.1
Lower Creek	5,755	2.9
b. Minor tributaries & immediate drainage (non-point load) -	2,450	1.2
c. Known municipal STP's -		
Drexel	1,625	0.8
Morganton	15,450	7.6
Valdese #1	1,205	0.6
Valdese #2	2,405	1.2
Lenoir	16,675	8.2
Marion	3,780	1.9
d. Septic tanks - Unknown	-	-
e. Known industrial - None	-	-
f. Direct precipitation* -	250	0.1
Total	202,435	100.0

2. Outputs -

Lake outlet - Catawba River 106,660

3. Net annual P accumulation - 95,775 kg.

* See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/yr	% of total
a. Tributaries (non-point load) -		
Catawba River	723,930	51.6
Hunting Creek	168,420	12.0
Hoyle Creek	6,540	0.5
McGalliard Creek	14,635	1.1
Howard Creek	[illegible],025	0.6
Freemason	14,720	1.1
Stafford Creek	11,675	0.8
Smoky Creek	9,450	0.7
Bristol Creek	13,585	1.0
Johns River	125,045	8.9
E. Fork, McGalliard Creek	1,345	0.1
Lower Creek	106,645	7.6
b. Minor tributaries & immediate drainage (non-point load) -	58,295	4.1
c. Known municipal STP's -		
Drexel	4,865	0.3
Morganton	46,340	3.3
Valdese #1	3,605	0.3
Valdese #2	7,215	0.5
Lenoir	50,010	3.6
Marion	11,340	0.8
d. Septic tanks - Unknown	-	-
e. Known industrial - None	-	-
f. Direct precipitation* -	15,350	1.1
Total	1,402,035	100.0

2. Outputs -

Lake outlet - Catawba River 1,268,715

3. Net annual N accumulation - 133,320 kg.

* See Working Paper No. 175.

D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km²/yr	kg N/km²/yr	N/P Ratio
Catawba River	36	413	11/1
Hunting Creek	957	2,540	3/1
Hoyle Creek	242	414	2/1
McGalliard Creek	599	762	<2/1
Howard Creek	64	659	10/1
Freemason Creek	33	779	24/1
Stafford Creek	30	725	24/1
Smoky Creek	15	446	30/1
Bristol Creek	29	571	20/1
Johns River	13	231	18/1
E. Fork, McGalliard Creek	65	585	9/1
Lower Creek	26	475	18/1

E. Yearly Loading Rates:

In the following table, the existing phosphorus loading rates are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" rate is the rate at which the receiving water would become eutrophic or remain eutrophic; his "permissible" rate is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic rate would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m^2/yr	14.24	6.74	98.6	9.4

Vollenweider loading rates for phosphorus ($g/m^2/yr$) based on mean depth and mean hydraulic retention time of Rhodhiss Lake:

"Dangerous" (eutrophic rate)	2.00
"Permissible" (oligotrophic rate)	1.00

V. LITERATURE REVIEWED

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VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	3719	LAKE WACCAMAW	534
2	3716	SANTEELAH LAKE	446
3	3711	MOUNTAIN ISLAND LAKE	419
4	3707	HIWASSEE LAKE	414
5	3704	FONTANA LAKE	392
6	3713	LAKE NORMAN	346
7	3708	LAKE JAMES	334
8	3710	LOOKOUT SHOALS	327
9	3715	RHODHISS LAKE	296
10	3705	LAKE HICKORY	283
11	3717	LAKE TILLERY	246
12	3709	LAKE JUNALUSKA	220
13	3702	BLEWETT FALLS LAKE	200
14	3718	WATERVILLE RESERVOIR	140
15	3701	BADIN LAKE	124
16	3706	HIGH ROCK LAKE	76

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
3701	BADIN LAKE	33 (5)	7 (1)	27 (4)	27 (4)	3 (0)	27 (4)	124
3702	BLEWETT FALLS LAKE	7 (1)	13 (2)	7 (1)	73 (11)	93 (14)	7 (1)	200
3704	FONTANA LAKE	100 (15)	33 (5)	93 (14)	100 (15)	3 (0)	63 (9)	392
3705	LAKE HICKORY	27 (4)	60 (9)	53 (8)	13 (2)	80 (12)	50 (7)	283
3706	HIGH ROCK LAKE	13 (2)	20 (3)	0 (0)	0 (0)	23 (2)	20 (3)	76
3707	HIWASSEE LAKE	87 (13)	80 (12)	87 (13)	47 (7)	50 (7)	63 (9)	414
3708	LAKE JAMES	60 (9)	87 (13)	80 (12)	7 (1)	23 (2)	77 (11)	334
3709	LAKE JUNALUSKA	47 (7)	27 (4)	43 (6)	20 (3)	50 (7)	33 (5)	220
3710	LOOKOUT SHOALS	53 (8)	47 (7)	60 (9)	67 (10)	60 (9)	40 (6)	327
3711	MOUNTAIN ISLAND LAKE	73 (11)	73 (11)	43 (6)	53 (8)	87 (13)	90 (13)	419
3713	LAKE NORMAN	67 (10)	53 (8)	73 (11)	40 (6)	23 (2)	90 (13)	346
3715	RHODHISS LAKE	20 (3)	67 (10)	33 (5)	93 (14)	70 (10)	13 (2)	296
3716	SANTEELAH LAKE	93 (14)	93 (14)	100 (15)	60 (9)	23 (2)	77 (11)	446
3717	LAKE TILLERY	40 (6)	40 (6)	13 (2)	33 (5)	70 (10)	50 (7)	246
3718	WATERVILLE RESERVOIR	0 (0)	0 (0)	20 (3)	80 (12)	40 (6)	0 (0)	140
3719	LAKE WACCAMAW	80 (12)	100 (15)	67 (10)	87 (13)	100 (15)	100 (15)	534

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P
3701	BADIN LAKE	0.042	0.680	466.750	7.190	14.900	0.012
3702	BLEWETT FALLS LAKE	0.090	0.655	476.889	4.167	10.800	0.034
3704	FONTANA LAKE	0.011	0.550	392.650	3.438	14.900	0.007
3705	LAKE HICKORY	0.047	0.320	461.000	7.275	13.400	0.008
3706	HIGH ROCK LAKE	0.090	0.580	477.454	14.283	14.800	0.017
3707	HIWASSEE LAKE	0.015	0.240	420.555	5.678	14.200	0.007
3708	LAKE JAMES	0.020	0.160	428.866	7.660	14.800	0.006
3709	LAKE JUNALUSKA	0.031	0.560	462.000	7.233	14.200	0.009
3710	LOOKOUT SHOALS	0.026	0.370	459.167	4.200	13.800	0.008
3711	MOUNTAIN ISLAND LAKE	0.018	0.270	462.000	5.580	12.800	0.005
3713	LAKE NORMAN	0.019	0.330	446.667	5.807	14.800	0.005
3715	RHODHISS LAKE	0.061	0.305	462.111	3.578	13.600	0.019
3716	SANTEELAH LAKE	0.011	0.160	366.400	5.360	14.800	0.006
3717	LAKE TILLERY	0.040	0.470	468.600	6.827	13.600	0.008
3718	WATERVILLE RESERVOIR	0.103	0.860	468.333	3.817	14.400	0.041
3719	LAKE WACCAMAW	0.018	0.120	455.667	3.583	9.800	0.004

APPENDIX B

CONVERSIONS FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR NORTH CAROLINA 10/21/75

LAKE CODE 3715 RHODHISS RESERVOIR

TOTAL DRAINAGE AREA OF LAKE(SQ MI) 1090.00

TRIBUTARY	SUB-DRAINAGE AREA(SQ MI)	NORMALIZED FLOWS(CFS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
3715A1	677.00	1330.00	1260.00	1350.00	1230.00	1050.00	1170.00	1050.00	1060.00	1170.00	1110.00	1200.00	1320.00	1191.10
3715A2	1090.00	1910.00	1980.00	2120.00	1670.00	1660.00	1630.00	1430.00	1610.00	1500.00	1810.00	1780.00	1990.00	1750.77
3715B1	25.60	72.00	88.00	89.00	81.00	61.00	50.00	48.00	58.00	54.00	56.00	55.00	61.00	63.66
3715C1	5.30	8.10	11.00	12.00	11.00	8.00	6.90	6.00	6.60	6.20	6.20	5.90	7.40	7.92
3715D1	7.40	12.00	16.00	18.00	16.00	12.00	10.00	9.00	9.80	9.10	9.10	8.70	11.00	11.70
3715E1	6.10	9.30	12.00	13.00	12.00	8.90	7.70	6.80	7.40	6.90	6.90	6.60	8.30	8.80
3715F1	7.30	11.00	15.00	16.00	15.00	11.00	9.20	8.10	8.80	8.20	8.20	7.90	9.90	10.66
3715G1	6.20	10.00	14.00	15.00	14.00	9.90	8.60	7.50	8.20	7.60	7.60	7.30	9.20	9.88
3715H1	8.20	18.00	20.00	23.00	21.00	15.00	12.00	11.00	14.00	13.00	13.00	13.00	15.00	15.64
3715J1	9.20	22.00	25.00	28.00	25.00	18.00	14.00	14.00	17.00	16.00	16.00	16.00	18.00	19.05
3715K1	289.00	240.00	284.00	308.00	276.00	194.00	150.00	144.00	183.00	166.00	172.00	166.00	193.00	205.88
3715L1	0.90	1.50	2.00	2.10	2.00	1.40	1.30	1.10	1.20	1.10	1.10	1.10	1.30	1.43
3715M1	86.60	86.00	126.00	188.00	136.00	89.00	76.00	71.00	88.00	65.00	62.00	66.00	79.00	94.17
3715Z2	41.20	84.00	105.00	116.00	107.00	78.00	65.00	59.00	66.00	62.00	63.00	61.00	63.00	77.23

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 1090.00
SUM OF SUB-DRAINAGE AREAS = 1090.00

TOTAL FLOW IN = 20625.12
TOTAL FLOW OUT = 21010.00

MEAN MONTHLY FLOWS AND DAILY FLOWS(CFS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
3715A1	3	73	3230.00	24	3270.00				
	4	73	2600.00	26	3190.00				
	5	73	2850.00	24	2080.00				
	6	73	1950.00	28	1930.00				
	7	73	1620.00	22	1540.00				
	8	73	1450.00	30	2280.00				
	9	73	1600.00	28	1220.00				
	10	73	1250.00	25	410.00				
	11	73	980.00	29	1280.00				
	12	73	1340.00	27	2930.00				
	1	74	2200.00	12	3090.00	24	3260.00		
	2	74	1970.00	16	2290.00	28	2480.00		
3715A2	3	73	4870.00	24	4200.00				
	4	73	3970.00	26	4100.00				
	5	73	4290.00	24	3100.00				
	6	73	3000.00	28	2860.00				
	7	73	2280.00	22	280.00				
	8	73	2700.00	30	2080.00				
	9	73	2060.00	28	1990.00				
	10	73	1830.00	25	540.00				
	11	73	1540.00	29	2470.00				
	12	73	2940.00	27	8010.00				
	1	74	3540.00	12	4120.00	24	2320.00		
	2	74	3070.00	16	4090.00	28	2970.00		

TRIBUTARY FLOW INFORMATION FOR NORTH CAROLINA 10/21/75

LAKE CODE 3715 ANDERSON RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CFS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
371581	3	73	120.00	28	70.00				
	4	73	80.00	26	68.00				
	5	73	90.00	24	49.00				
	6	73	60.00	28	47.00				
	7	73	31.00	22	27.00				
	8	73	38.00	30	23.00				
	9	73	24.00	28	18.00				
	10	73	36.00	25	26.00				
	11	73	34.00	29	100.00				
	12	73	78.00	27	250.00				
	1	74	90.00	12	70.00	24	55.00		
	2	74	70.00	16	46.00	28	47.00		
371501	3	73	25.00	4	13.00				
	4	73	21.00	26	18.00				
	5	73	21.00	24	14.00				
	6	73	14.00	28	13.00				
	7	73	8.50	22	8.10				
	8	73	7.00	30	6.70				
	9	73	6.50	28	5.60				
	10	73	6.40	25	4.80				
	11	73	5.60	29	10.00				
	12	73	16.00	27	50.00				
	1	74	15.00	12	11.00	24	13.00		
	2	74	14.00	16	12.00	28	12.00		
371501	3	73	35.00	4	19.00				
	4	73	29.00	26	25.00				
	5	73	29.00	24	19.00				
	6	73	21.00	28	18.00				
	7	73	12.00	22	11.00				
	8	73	9.50	30	9.40				
	9	73	9.00	28	7.80				
	10	73	9.00	25	6.70				
	11	73	7.80	29	14.00				
	12	73	22.00	27	70.00				
	1	74	21.00	12	15.00	24	18.00		
	2	74	19.00	16	16.00	28	16.00		
371561	3	73	28.00	24	17.00				
	4	73	24.00	24	21.00				
	5	73	24.00	24	16.00				
	6	73	16.00	28	15.00				
	7	73	10.00	22	9.30				
	8	73	8.00	30	7.80				
	9	73	7.50	28	6.40				
	10	73	7.40	25	5.50				
	11	73	6.50	29	11.00				
	12	73	18.00	27	60.00				
	1	74	17.00	12	12.00	24	15.00		
	2	74	16.00	16	14.00	28	13.00		

TRIBUTARY FLOW INFORMATION FOR NORTH CAROLINA 10/21/75

LAKE CODE 3715 WHOOMISS RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CFS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
3715F1	3	73	35.00	24	28.00				
	4	73	28.00	24	16.00				
	5	73	29.00	24	19.00				
	6	73	20.00	28	18.00				
	7	73	12.00	22	11.00				
	8	73	9.60	30	9.30				
	9	73	9.00	28	7.70				
	10	73	8.80	25	6.60				
	11	73	7.70	29	14.00				
	12	73	22.00	27	70.00				
	1	74	20.00	12	15.00	24	12.00		
	2	74	19.00	16	16.00	28	16.00		
3715G1	3	73	30.00	24	17.00				
	4	73	24.00	26	21.00				
	5	73	24.00	24	16.00				
	6	73	17.00	28	15.00				
	7	73	10.00	22	9.40				
	8	73	8.20	30	7.90				
	9	73	7.60	28	6.50				
	10	73	7.50	25	5.60				
	11	73	6.60	29	12.00				
	12	73	19.00	27	60.00				
	1	74	17.00	12	12.00	24	15.00		
	2	74	16.00	16	14.00	28	14.00		
3715H1	3	73	40.00	24	22.00				
	4	73	33.00	24	28.00				
	5	73	42.00	24	21.00				
	6	73	17.00	28	20.00				
	7	73	11.00	22	12.00				
	8	73	13.00	30	10.00				
	9	73	8.30	28	8.60				
	10	73	13.00	25	7.40				
	11	73	12.00	29	15.00				
	12	73	30.00	27	65.00				
	1	74	37.00	12	28.00	24	19.00		
	2	74	27.00	16	17.00	28	20.00		
3715J1	3	73	45.00	24	30.00				
	4	73	39.00	26	31.00				
	5	73	48.00	24	21.00				
	6	73	20.00	28	11.00				
	7	73	13.00	22	8.10				
	8	73	16.00	30	8.30				
	9	73	9.30	28	8.30				
	10	73	15.00	25	10.00				
	11	73	14.00	29	47.00				
	12	73	35.00	27	75.00				
	1	74	43.00	12	32.00	24	24.00		
	2	74	31.00	16	20.00	28	23.00		

TRIBUTARY FLOW INFORMATION FOR NORTH CAROLINA 10/21/75

LAKE CODE 3715 KERR RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CFS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
371581	3	73	850.00	24	620.00				
	4	73	700.00	26	630.00				
	5	73	810.00	24	430.00				
	6	73	425.00	28	420.00				
	7	73	300.00	22	160.00				
	8	73	600.00	30	165.00				
	9	73	250.00	28	165.00				
	10	73	290.00	25	200.00				
	11	73	275.00	29	1000.00				
	12	73	815.00	27	1870.00				
	1	74	800.00	12	670.00	24	500.00		
	2	74	635.00	16	410.00	28	480.00		
371581	3	73	4.30	24	2.50				
	4	73	3.50	26	3.10				
	5	73	3.50	24	2.30				
	6	73	2.10	28	2.20				
	7	73	1.50	22	1.40				
	8	73	1.20	30	1.10				
	9	73	1.10	28	0.90				
	10	73	1.00	25	0.80				
	11	73	0.90	29	1.70				
	12	73	2.80	27	8.80				
	1	74	2.50	12	1.80	24	2.20		
	2	74	2.40	16	2.00	28	2.00		
371581	3	73	280.00	24	190.00				
	4	73	210.00	26	380.00				
	5	73	225.00	24	160.00				
	6	73	200.00	28	170.00				
	7	73	98.00	22	100.00				
	8	73	250.00	30	90.00				
	9	73	82.00	28	65.00				
	10	73	75.00						
	11	73	68.00	29	145.00				
	12	73	280.00	27	900.00				
	1	74	220.00	12	150.00	24	170.00		
	2	74	195.00	16	140.00	28	160.00		
371577	3	73	200.00						
	4	73	150.00						
	5	73	165.00						
	6	73	120.00						
	7	73	70.00						
	8	73	150.00						
	9	73	50.00						
	10	73	60.00						
	11	73	55.00						
	12	73	140.00						
	1	74	115.00						
	2	74	110.00						

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 75/10/20

371501
35 46 32.0 081 37 30.0
RHODHISS LAKE
37023 NORTH CAROLINA

11EPALES 2111202
3 0008 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/30	10 00	0000	10.2		30	50K	7.70	10K	0.100	0.300	0.280	0.022
	10 00	0005	10.2	10.0		50K	7.70	10K	0.090	0.200	0.220	0.025
73/07/06	14 25	0000	21.6	7.4	24	55	6.80	18	0.110	0.600	0.250	0.028
	14 25	0005	21.4	7.4		50	6.80	17	0.090	0.400	0.210	0.013
73/09/24	09 45	0000	22.4	6.6	28	55	6.70	14	0.120	0.700	0.120	0.024

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/30	10 00	0000	0.064	1.5
	10 00	0005	0.069	
73/07/06	14 25	0000	0.059	1.4
	14 25	0005	0.056	
73/09/24	09 45	0000	0.055	1.8

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 7[illegible]/10/20

371502
35 46 40.0 GRI 31 50.0
RHODHISS LAKE
37023 NORTH CAROLINA

11ERALES 2111202
3 0038 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CONDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/30	10 20	0000	11.9		22	57	7.60	10K	0.110	0.400	0.280	0.040
	10 20	0005	11.4	9.2		50K	7.60	10K	0.080	0.200	0.240	0.040
	10 20	0015	11.6	9.4		50K	7.60	10K	0.100	0.300	0.240	0.027
	10 20	0034	11.0	9.0		50K	7.60	10K	0.110	0.300	0.250	0.021
73/07/06	14 45	0000	27.6		36	60	9.30	18	0.080	0.800	0.090	0.007
	14 45	0005	23.7	8.7		53	7.00	18	0.060	0.300	0.160	0.007
	14 45	0015	21.7	6.9		53	6.70	16	0.100	0.200	0.230	0.009
	14 45	0035	20.0	5.3		53	6.60	16	0.190	0.300	0.240	0.011
73/09/24	10 05	0000	24.8		55	66	8.60	12	0.060	0.500	0.040	0.021
	10 05	0005	23.4	7.0		65	7.30	15	0.050	0.400	0.070	0.033
	10 05	0015	22.5	5.8		59	6.70	15	0.120	0.300	0.110	0.030
	10 05	0030	21.6	4.2		61	6.60	16	0.210	0.500	0.100	0.028

32

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/30	10 20	0000	0.102	1.7
	10 20	0005	0.093	
	10 20	0015	0.091	
	10 20	0034	0.105	
73/07/06	14 45	0000	0.044	3.4
	14 45	0005	0.044	
	14 45	0015	0.052	
	14 45	0035	0.116	
73/09/24	10 05	0000	0.074	6.9
	10 05	0005	0.076	
	10 05	0015	0.062	
	10 05	0030	0.080	

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/10/20

371503
35 46 23.0 081 26 02.0
RHODHISS LAKE
37023 NORTH CAROLINA

11EPALES 2111202
3 0050 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/30	11 00	0000	11.7		36	50K	7.70	10K	0.050	0.400	0.220	0.021
	11 00	0007	11.7	10.0		55	7.70	10K	0.040	0.200	0.210	0.016
	11 00	0015	11.3	9.7		55	7.60	10	0.060	0.200K	0.230	0.018
	11 00	0030	10.5	9.4		60	7.60	10	0.070	0.200K	0.240	0.025
	11 00	0045	10.0	9.8		58	7.60	10K	0.090	0.200K	0.240	0.017
73/07/06	16 05	0000	27.4	11.4	36	61	9.30	17	0.110	0.900	0.100	0.013
	16 05	0005	26.5	9.7		60	8.60	18	0.100	0.400	0.100	0.010
	16 05	0030	20.0	5.1		55	6.70	18	0.170	0.200	0.230	0.012
	16 05	0048	18.9	1.4		65	6.50	24	0.440	0.600	0.130	0.010
73/09/24	10 30	0000	25.3		74	61	8.50	16	0.050	0.500	0.030	0.012
	10 30	0005	24.9	9.4		59	7.70	14	0.050	0.400	0.020	0.013
	10 30	0010	23.2	5.2		57	6.70	15	0.050	0.400	0.040	0.016
	10 30	0020	22.1	4.2		55	6.50	15	0.130	0.300	0.100	0.017
	10 30	0030	21.8	3.0		54	6.40	16	0.230	0.400	0.110	0.023
	10 30	0044	21.6	4.0		61	6.40	16	0.200	0.400	0.110	0.027

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/30	11 00	0000	0.075	6.7
	11 00	0007	0.060	
	11 00	0015	0.061	
	11 00	0030	0.061	
	11 00	0045	0.097	
73/07/06	16 05	0000	0.051	2.1
	16 05	0005	0.038	
	16 05	0030	0.048	
	16 05	0048	0.062	
73/09/24	10 30	0000	0.033	6.7
	10 30	0005	0.038	
	10 30	0010	0.034	
	10 30	0020	0.031	
	10 30	0030	0.044	
	10 30	0044	0.066	

K VALUE KNOWN TO BE
LESS THAN INDICATED

APPENDIX E

TRIBUTARY DATA

STORET RETRIEVAL DATE 75/10/20

3715A1 LS3715A1
35 46 30.0 081 41 30.0
CATAWBA RIVER
37119 BURKE CO HWY MAP
17RHODHISS RESVR
NC HWY 18 BRDG .25 MI N OF MORGANTON
11EMALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/24	11	25	0.180	0.910	0.038	0.017	0.045
73/04/26	18	15	0.198	1.050	0.070	0.025	
73/05/24	18	25	0.170	0.340	0.017	0.025	0.075
73/06/28	18	00	0.168	0.350	0.037	0.028	0.082
73/07/22	14	45	0.176	0.240	0.016	0.015	0.030
73/08/30	18	45	0.132	0.100K	0.024	0.006	0.035
73/09/28	19	25	0.075		0.088	0.007	
73/10/25	18	05	0.092	0.350	0.038	0.026	
73/11/29	18	20	0.184	0.650	0.048	0.020	0.095
73/12/27	16	45	0.320	1.300	0.490	0.020	0.125
74/01/12	14	15	0.184	0.200	0.028	0.012	0.040
74/01/24	18	15	0.224	0.400	0.036	0.012	0.035
74/02/16	13	50	0.216	0.300	0.025	0.010	0.075
74/02/28	17	30	0.156	0.200	0.015	0.010	0.055

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 73/10/20

3715A2 LS3715A2
35 46 30.0 081 26 00.0
CATAWBA RIVER
37 BURKE CO HWY MAP
O/RHODHISS RESVR
RD BRDG IN RHODHISS .2 MI E OF DAM
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/24	11 00		0.200	0.390	0.050	0.015	0.060
73/04/26	18 00		0.130	0.480	0.067	0.024	0.065
73/05/24	18 20		0.080	1.200	0.150	0.014	0.050
73/06/28	18 30		0.154	1.890	0.160	0.010	0.040
73/07/22	14 35		0.110	0.460	0.130	0.005K	0.040
73/08/30	18 15		0.096	0.400	0.115	0.005K	0.045
73/09/28	20 00		0.048		0.089	0.008	
73/10/25	15 30		0.063	0.550	0.064	0.018	
73/11/29	17 17		0.116	1.450	0.116	0.020	0.090
73/12/27	15 00		0.276	0.400	0.088	0.024	0.105
74/01/12	13 00		0.224	0.200	0.044	0.036	0.075
74/01/24	16 00		0.208	0.100K	0.028	0.020	0.045
74/02/16	14 00		0.232	0.300	0.040	0.025	0.085
74/02/28	18 00		0.168	0.400	0.050	0.020	0.110

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/10/20

371581 L=371581
35 46 00.0 081 39 30.0
UNKNOWN CREEK
37 BURKE CO HWY MAP
T/RHODHISS RESVR
RD BRDG .5 MI NNE OF MORGANTON
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/28	14 30		0.320	4.600	0.900	1.100	1.700
73/04/26	18 00		0.720	4.300	0.357	0.068	0.850
73/05/24	18 15		0.175	7.480	1.900	1.040	1.900
73/06/28	17 50		0.120	4.000	0.920	1.040	1.600
73/07/22	14 30		0.250	3.700		0.199	0.780
73/09/28	19 15		0.040		2.800	1.800	
73/10/25	17 50		0.100	2.800	0.720	2.640	3.100
73/11/29	18 10		0.275	3.700	0.480	1.010	1.880
73/12/27	16 30		0.704	1.500	0.192	0.124	0.385
74/01/12	14 00		0.490	1.200	0.380	0.112	0.290
74/01/24	18 00		0.390	2.200	0.240	0.528	0.910
74/02/16	13 30		0.430	3.600	0.710	0.490	1.600
74/02/28	17 00		0.288	1.900	0.270	1.570	1.600

STORET RETRIEVAL DATE 75/10/20

3715C1 LS3715C1
35 46 30.0 081 35 00.0
HOWARD CREEK
37 7.5 DREXEL
T/RHODHISS
RD BRDG .5 MI NE OF DREXEL CITY LIMITS
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/04	13 45		0.480	1.260	0.360	0.100	0.230
73/04/26	19 30		0.510	4.300	0.470		0.970
73/05/24	19 10		0.510	1.400	0.590	0.189	0.315
73/06/28	18 00		0.105	2.400	0.100	0.004	0.420
73/07/22	15 00		0.800	0.560	0.097	0.210	0.260
73/08/30	19 00		0.220	0.480	0.037	0.005K	0.050
73/09/28	21 00		0.970		0.510	0.250	
73/10/25	16 40		0.870	2.100	0.860	0.490	0.690
73/11/29	18 05		0.690	1.500	0.704	0.270	0.410
73/12/27	15 45		0.600	0.500	0.200	0.084	0.150
74/01/12	13 30		0.560	0.490	0.330	0.168	0.250
74/01/24	15 30		0.588	0.700	0.384	0.148	0.220
74/02/15	14 50		0.470	1.000	0.300	0.100	0.270
74/02/28	19 00		0.540	1.300	0.460	0.195	0.300

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/10/20

371501 L5371501
35 46 00.0 081 34 00.0
MCGALLIARD CREEK
37 7.5 DREXEL
T/RHODHISS RESVR
RD BRDG .2 MI N OF NW VALDESE CITY LIMIT
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/04	12	15	0.390	1.100	0.038	0.230	0.690
73/04/26	18	45	0.420	5.700	0.160		2.400
73/05/24	18	50	0.270	3.000	0.330	0.940	1.280
73/06/28	17	45	0.640	1.400	0.360	0.200	0.470
73/07/22	14	57	0.290	0.960	0.326	0.620	0.690
73/08/30	19	20	1.060	2.200	0.680	0.350	0.525
73/09/28	20	50	0.189		0.460	2.480	
73/10/25	16	30	0.154	2.100	0.096	3.900	4.100
73/11/29	17	55	0.160	1.600	0.100	2.500	2.700
73/12/27	15	30	0.890	0.200	0.080	0.232	0.300
74/01/12	13	25	0.368	0.300	0.044	0.490	0.550
74/01/24	15	20	0.312	0.800	0.040	1.250	1.500
74/02/16	14	41	0.400	0.600	0.060	0.145	0.520
74/02/28	18	30	0.320	1.000	0.055	1.400	1.400

STORET RETRIEVAL DATE 75/10/20

3715E1 LS3715E1
35 45 30.0 081 33 00.0
HOYLE CREEK
37 7.5 DREXEL
T/RHODHISS RESVR
RD BRDG .2 MI N OF NE VALDESE CITY LIMIT
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/24	11	50	0.220	0.520	0.035	0.176	0.280
73/04/24	18	30	0.290	2.200	0.110		0.800
73/05/24	19	15	0.140	0.870	0.039	0.357	0.530
73/06/28	17	55	0.270	3.000	0.138	0.073	1.900
73/07/22	14	50	0.198	0.562	0.138	0.160	0.210
73/08/30	18	45	0.076	0.880	0.126	0.600	0.870
73/09/28	20	30	0.154		0.075	0.790	
73/10/25	18	10	0.126	1.450	0.028	0.700	0.870
73/11/29	17	10	0.148	0.800	0.058	0.360	0.450
73/12/27	15	15	0.420	0.500	0.176	0.088	0.170
74/01/12	13	10	0.270	0.700	0.064	0.430	0.580
74/01/24	15	15	0.300	0.500	0.156	0.250	0.540
74/02/16	14	20	0.300	0.800	0.150	0.070	0.315
74/02/28	17	45	0.240	0.600	0.035	0.575	0.720

STORET RETRIEVAL DATE 75/10/20

3715F1 LS3715F1
35 48 00.0 081 30 30.0
FREEMASON CREEK
37 7.5 DREXEL
T/RMOOHISS RESVR
RD 1115 BRDG 4 MI W OF GRANITE FALLS
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/24	11 45		0.550	0.440	0.115	0.018	0.047
73/04/24	18 25		0.660		0.540	0.029	
73/05/24	18 14		0.378	0.840	0.080	0.039	0.130
73/06/28	18 21		0.470	3.300	0.240	0.024	
73/07/22	14 10		0.378	1.150	0.100	0.025	0.040
73/08/30	18 15		0.550	1.540	0.420	0.030	0.055
73/09/28			0.390		0.160	0.044	
73/10/25	18 00		0.320	0.850	0.037	0.012	0.035
73/11/29	18 10		0.368	2.100	0.116	0.028	
73/12/27	15 30		0.770	0.300	0.072	0.028	0.070
74/01/12	13 40		0.570	0.800	0.200	0.036	0.085
74/01/24	18 20		0.600	0.600	0.080	0.025	0.070
74/02/16			0.216	0.200	0.020	0.010	0.040
74/02/28	18 27		0.490	0.300	0.085	0.025	0.065

STORET RETRIEVAL DATE 75/10/20

371561 LS371561
35 47 30.0 081 33 00.0
STAFFORD CREEK
37 7.5 DREXEL
T/RHODHISS RESVR
RD 1140 BRDG 1 MI SE LOVELADY CHURCH
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/24	11 20		0.160	1.890	0.066	0.014	0.015
73/04/24	18 05		0.335		0.210	0.008	
73/05/24	18 21		0.195	1.320	0.048	0.008	0.020
73/06/25	18 13		0.320	4.300	0.252	0.036	
73/07/22	14 00		0.170	2.100	0.105	0.012	0.015
73/08/30	18 30		0.147	0.290	0.052	0.008	0.020
73/09/28			0.120		0.037	0.006	
73/10/25	18 10		0.105	0.700	0.029	0.029	0.140
73/11/29	18 00		0.132	0.700	0.048	0.012	
73/12/27	15 00		0.224	0.300	0.032	0.005K	0.005
74/01/12	13 30		0.192	0.350	0.032	0.008	0.015
74/01/24	18 10		0.184	0.100K	0.016	0.016	0.020
74/02/16	15 40		0.504	1.300	0.330	0.055	0.270
74/02/28	18 20		0.135	0.100K	0.030	0.005	0.025

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/10/26

3715M1 L53715M1
35 48 00.0 081 36 30.0
SMOKY CREEK
37 7.5 DREXEL
T/RHODHISS RESVR
RD 1515 BRDG .4 MI E JCT WITH RD 1513
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/24	11 00		0.160	0.310	0.046	0.005K	0.015
73/04/24	17 50		0.210		0.068	0.010	
73/05/24	18 27		0.089	1.150	0.115	0.013	0.025
73/06/28	18 00		0.170	1.500	0.290	0.025	
73/07/22	13 49		0.154	0.690	0.200	0.009	0.020
73/08/30	18 40		0.120	0.610	0.035	0.006	0.015
73/09/28			0.100		0.032	0.005K	
73/10/25	18 20		0.077	0.200	0.011	0.023	
73/11/29	17 47		0.156	0.300	0.028	0.012	
73/12/27	14 30		0.250	0.200	0.048	0.012	0.015
74/01/12	13 16		0.192	0.400	0.040	0.008	0.020
74/01/24	18 00		0.192	0.100K	0.012	0.012	0.015
74/02/16	13 25		0.200	0.200	0.020	0.010	0.045
74/02/28	18 10		0.176	0.300	0.025	0.015	0.030

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/10/20

371501 LS371501
35 49 00.0 081 39 30.0
BRISTOL CREEK
37 BURKE CO HWY MAP
T/RHODHISS RESVR
NC HWY 18 BRDG .3 MI NE OF CHESTERFIELD
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/24	12 25		0.132	0.140	0.040	0.007	0.015
73/04/26	18 45		0.231	3.750	0.120	0.011	
73/05/24	18 55		0.074	0.400	0.025	0.012	0.027
73/06/28	18 30		0.130	1.100	0.077	0.025	
73/07/22	15 10		0.105	0.690	0.033	0.006	0.025
73/08/30	19 15		0.110	0.220	0.035	0.005K	0.020
73/09/28	19 48		0.078		0.093	0.005	
73/10/25	18 40		0.069	0.200	0.010	0.021	0.140
73/11/29	19 00		0.120	0.100K	0.036	0.005K	0.035
73/12/27	09 15		0.192	0.400	0.028	0.008	0.045
74/01/12	15 00		0.160	0.200	0.020	0.006	0.025
74/01/24	18 45		0.148	0.900	0.044	0.008	0.015
74/02/16	14 30		0.156	0.200	0.020	0.005	0.050
74/02/28	18 25		0.124	0.100	0.015	0.010	0.040

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/10/20

3715K1 LS3715K1
35 47 30.0 081 40 30.0
JOHNS RIVER
37 BURKE CO HWY MAP
T/RHODISS RESVR
NC HWY 18 BRDG .7 MI SW OF CHESTERFIELD
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/24	12 05		0.231	0.205	0.020	0.005K	0.020
73/04/26	18 30		0.091	0.370	0.046	0.010	0.080
73/05/24	18 35		0.034	0.930	0.030	0.010	0.020
73/06/28	18 10		0.147	0.450	0.066	0.014	0.100
73/07/22	15 00		0.094	0.280	0.035	0.007	0.035
73/08/30	18 55		0.035	0.880	0.025	0.005K	0.015
73/09/28	19 35		0.069		0.072	0.008	
73/10/25	18 15		0.025	0.200	0.010	0.019	
73/11/29	18 50		0.112	1.650	0.064	0.012	0.030
73/12/27	17 00		0.290	0.400	0.024	0.012	0.090
74/01/12	14 35		0.184	0.300	0.012	0.006	0.015
74/01/24	18 30		0.168	0.800	0.084	0.008	0.008
74/02/16	14 10		0.168	0.100	0.020	0.005	0.020
74/02/28	18 05		0.184	0.100	0.015	0.005	0.025

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/10/20

371SM1
35 49 30.0 081 38 10.0
LOWER CREEK
37 BURKE CO HWY MAP
T/LK RHODHISS
ST RD 1501 5 MI NE OF LENOIR
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/24	10	30	0.350	0.690	0.160	0.020	0.135
73/04/26	17	30	0.360	1.600	0.271	0.011	0.320
73/05/24	18	40	0.270	2.900	0.240	0.075	0.250
73/06/28	17	45	0.430	2.400	0.375	0.032	0.390
73/07/22	13	38	0.470	1.150	0.260	0.084	0.210
73/08/30	18	50	0.500	1.200	0.231	0.138	0.270
73/09/28			0.450		0.176	0.135	
73/10/25	18	32	0.460	3.600	0.320	0.168	0.480
73/11/29	17	40	0.380	0.800	0.140	0.068	0.375
73/12/27	14	00	0.450	0.300	0.064	0.024	0.115
74/01/12	13	05	0.420	0.560	0.104	0.044	0.165
74/01/24	17	50	0.410	0.600	0.105	0.046	0.170
74/02/16	13	10	0.410	1.700	0.130	0.045	0.230
74/02/28	17	55	0.400	0.800	0.160	0.065	0.315

STORET RETRIEVAL DATE 75/10/20

3715L1 LS3715L1
35 45 30.0 081 34 00.0
E FORK MCGALLAIRD CREEK
37 7.5 DREAEL
T/RHODHISS RESVR
RD BRDG .2 MI N OF NW VALDESE CITY LIMIT
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/24	12 00		0.170	0.260	0.050	0.005K	0.005K
73/04/26	18 20		0.300	3.150	0.132	0.016	
73/05/24	19 00		0.115	0.960	0.039	0.008	0.015
73/06/28	18 05		0.220	1.300	0.063	0.105	0.840
73/07/22	14 55		0.176	0.600	0.048	0.005K	0.065
73/08/30	14 10		0.370	2.440	0.138		
73/09/28	20 40		0.140		0.060	0.005K	
73/10/25	16 25		0.120	0.500	0.032	0.017	0.165
73/11/29	17 50		0.108	0.200	0.028	0.005K	
73/12/27	15 20		0.232	0.100K	0.016	0.005K	0.005K
74/01/12	13 15		0.168	0.300	0.016	0.005K	0.020
74/01/24	15 10		0.200	0.100K	0.016	0.005K	0.005K
74/02/16	14 40		0.260	0.200	0.025	0.005	0.040
74/02/28	15 50		0.200	0.100K	0.015	0.005K	0.020

K VALUE KNOWN TO BE
LESS THAN INDICATED